PREVALENCE OF ASTHMA, RHINITIS AND ECZEMA AMONG SCHOOLCHILDREN IN KELANTAN, MALAYSIA

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ABSTRACT

This study was part of an international effort to evaluate the epidemiology of asthma and allergic diseases around the world.

AIMS: To describe the prevalence and severity of asthma, rhinitis and eczema in Kelantanese schoolchildren .

METHODS: The international study of asthma and allergies in childhood (ISAAC) written questionnaire was administered to 7055 schoolchildren from February 1995 to August 1995. The respondents were parents of 5-7 year children (n = 3939), and schoolchildren 12-14 years (n = 3116). The ISAAC video questionnaire was shown to children aged 12-14 years after the written questionnaire.

RESULTS: The overall cumulative and 12 month prevalence of wheezing were 9.4% and 6.0% respectively. The prevalence of doctor diagnosed asthma was 9.4%. Both cumulative ($p = 0.0006$) and 12 month prevalence of wheeze ($p = 0.014$) was significantly higher in 12-14 years old children than 5-7 years old children. There was no significant differences in the prevalence of wheeze between males and females. The prevalence of rhinitis and eczema among children 5-7 years age group were 18.2% and 38.2%; and among children 12-14 years age group were 13.7% and 9.9% respectively.

CONCLUSION: The prevalence of allergic disorders in Kota Bharu is common but is much lower than that of countries in the West and Singapore.

KEY WORDS: asthma, rhinitis, eczema, prevalence, severity

INTRODUCTION

Asthma is one of the most important diseases of childhood, causing morbidity, school absence and substantial effects on the activities of the mother and family[1]. In developed countries the rates of hospital admissions[2] and attendances at general practitioners for asthma in childhood has been noted to be increasing [3]. Epidemiological surveys conducted in developed countries using similar methodologies suggest that the prevalence of asthma and other atopic disorders are increasing[4,5,6.7,8]. Although epidemiological data on asthma are still relatively few in Asian countries, available data suggest that the prevalence of atopic disorders is also increasing. [9,10,11,12,13,14]. The principle aetiological factor in asthma is thought to be related to allergen exposure in the early years of life and atopy [15,16], however other non-allergenic environmental factors may also be responsible for this increase[17]. The different prevalence rates of asthma in Asian Pacific countries and the West suggest that differences in lifestyle and industrialisation may be responsible[9].

A major difficulty with epidemiological studies of childhood asthma is the lack of accurate diagnostic criteria to clearly distinguish asthma from normal [18] In most studies, parentally or self-reported reported wheeze is the usual criterion for categorising children as asthmatic and these questionnaire survey have obvious problems with recall bias. Differences in definition and methodologies in epidemiological surveys may have resulted in variance of asthma prevalence between different populations and times. Using written questionnaires for international comparison has the added problem of language as there may be no exact equivalent of wheeze in different languages. To maximise the value of epidemiological research a standardised written and video questionnaire has been developed to enable international and temporal comparisons[19].

There has been two previous studies on prevalence of asthma in children in Malaysia. A study in Kuala Lumpur, the capital of Malaysia, in 1990 the prevalence of doctor-diagnosed asthma was 8.7% and persistent wheeze was 8.0% in schoolchildren [20] and a study in Kota Kinabalu in 1992, a less developed town in East Malaysia, showed a much lower prevalence of cumulative wheeze of 7.7% in schoolchildren [21]. There has been speculation that changes in lifestyle and urbanisation in industrialised countries may be partly responsible for increasing prevalence of asthma [9]. The prevalence of asthma thus may vary with different levels of affluence and industrialisation in different places within the country.

Using the international study of asthma and allergies in children (ISAAC) written and video questionnaire [19], the aim of this study was to determine the prevalence and severity of asthma, rhinitis and eczema in schoolchildren in Kota Bharu, a less developed town in the north-eastern state of Kelantan in Peninsula Malaysia, and to compare the prevalence and severity of asthma, rhinitis and eczema in this population with other countries.

METHODS

Questionnaires

i) Written questionnaire

The three one page English questionnaire developed by ISAAC was translated into Bahasa Malaysia, the official language of the country, and Mandarin. The asthma symptoms questionnaire concentrates on past and current wheezing episodes, frequency of wheezing attacks in the previous 12 months, sleep disturbance, and speech limitation during attacks, exercise-induced wheezing and nocturnal cough. The rhinitis symptoms questionnaire contains questions on past and current episodes of sneezing or running or blocked nose when the child do not have a cold or flu, association of these nose symptoms with itchy-watery eyes, and the interference of these symptoms with daily activities. The eczema symptoms questionnaire concentrates on past and current of itchy rash, rash typical of atopic eczema distribution and interference of sleep by the itchy rash.

ii) Video questionnaire

The international composite video questionnaire developed by ISAAC (AVQ 3.0) was administered to all children in age group 12-14 years after completion of the written questionnaire. The questionnaire involves five sequences of asthma symptoms in young persons. The five sequences were i) wheezing while at rest, ii) wheezing after exercise, iii) waking at night with wheezing, iv) waking at night with coughing, and v) a severe attack of asthma, involving difficulty breathing at rest. After each sequence, participants were asked to specify whether their breathing had ever been like that of the person in the video; if so, they are asked further nested questions as to whether this had occurred in the last year, and one or more times a month.

Data Collection and analysis

The study was conducted in the district of Kota Bharu, state of Kelantan in Malaysia from February 1995 to August 1995. We studied two age groups of schoolchildren 5-7 years and 12-14 years. Thirty-three of 94 primary schools and 13 of 34 secondary schools and were randomly selected for the study. In primary schools, all standard one pupils (greatest proportion of 6 and 7 year olds), and in secondary schools all form two pupils (greatest proportion of 13 year olds and 14 year olds) were studied. In the only Chinese secondary school selected form one pupils were studied as this include the greatest proportion of 13 and 14-year olds.

Five to 7 year olds children were handed the written questionnaires to be filled by their parents or guardian while 12-14 year olds self administered the questionnaire in the classroom. After completing the written questionnaires the video questionnaire was shown to 12-14 year old children. The survey was conducted in Bahasa Malaysia except for a Chinese primary school where Mandarin questionnaires were also used.

Consent for the study was obtained from the Ministry of Education, Malaysia and the research and ethics committee, Universiti Sains Malaysia. All data were analysed using the EPI6 software.(Version 6.02) for personal computers.

RESULTS

A total number of responses were 3939 from the 5-7 year age and 3116 from the 12-14 year age group group. The age distribution of the children were as follows: 5 years old - 0.2%; 6 years old - 71.5%; 7 years old - 28.3%; 12 years old - 0.3%; 13 years old - 65.6%; and 14 years old 34.1%. The response rate was 95.68% in the 5-7 years age group and 95.97% in the 12-14 years age group, giving an overall response rate of 95.8%. There were 93.2% Malays, 6.2% Chinese, 0.1% Indians and 0.5% other races.

PREVALENCE OF ASTHMA

The prevalence and severity of asthma symptoms using the written questionnaire is summarised in table 1. The prevalence of cumulative wheeze ($p = 0.0006$) and current wheeze ($p = 0.014$) were both significantly higher in the 12-14 age group (10.7% and 6.8% respectively) than in the 5-7 year age group (8.3% and 5.4% respectively). The 12-14 year age group also had more frequent attacks of wheeze in the past year but the severity of wheezing attacks limiting speech was similar in both groups. The prevalence of doctor diagnosed asthma ($p = 0.032$) was lower in the 12-14 year age group and exercise induced asthma significantly higher than children in the 5-7 year age group.

When males and females in both age groups were compared there were no difference in cumulative wheeze (males 9.7%, females 8.9% ; $p = 0.25$) and current wheeze (males 6.3%, females 5.7% ; $p = 0.29$) between the sexes. Doctor diagnosed asthma however was significantly more common in males 10.7% than females 8.0% ($p = 0.0001$).

The prevalence and severity of asthma symptoms using the video questionnaire in 12-14 year olds were as shown in table 2. The prevalence of cumulative (14.2%) is about one-third higher than that using the written questionnaire (10.7%). The concordance rate concordance between the written and video questionnaire (table 3 and table 4) was 86.8% for cumulative wheeze and 90.2% for current wheeze. The kappa index for cumulative and current wheezw was 0.49 and 0.47 respectively.

PREVALENCE OF RHINITIS

The prevalence and severity of of rhinitis symptoms were as shown in table 5. Children in the 12-14 year age group had significantly more cumulative rhinitis symptoms ($p<0.0001$), current rhinitis symptoms ($p<0.0001$) and rhinitis symptoms associated with itchy-watery eyes ($p<0.0001$) than children in the 5-7 year age group. The prevalence of cumulative rhinitis symptoms in males (28.1%) was significantly higher than females (25.8%; $p = 0.03$) but there was no difference in the prevalence of recent rhinitis symptoms year between males and females ($p = 0.31$).

PREVALENCE OF ECZEMA

The prevalence and severity of eczema symptoms in were as shown in table 6. The prevalence of cumulative itchy rash ($p<0.0001$), current itchy rash ($p<0.0001$), and itchy rash affecting a typical distribution ($p<0.0001$) were significantly more common in 5-7 year olds than 12-14 year olds. There were no differences in the prevalence of cumulative itchy rash ($p = 0.46$) and current itchy rash ($p = 0.89$) between males and females.

As expected there was a strong association between reported asthma symptoms and symptoms of other atopic disorders. Among children with cumulative wheeze using the written questionnaire, 382 (57.9%) also has symptoms of rhinitis and 170 (25.8%) also has symptoms of eczema, and using the video questionnaire 282 (63.8%) also has symptoms of rhinitis and 88 (19.9%) has symptoms of eczema. Children with asthma symptoms were more likely to have rhinitis symptoms (OR 4.39 for cumulative wheeze) than eczema symptoms. Children with current wheeze were similarly more likely to have rhinitis symptoms (OR 5.33). Children with current wheeze however were more likely to have eczema symptoms (OR 3.71) than children who had cumulative wheeze (OR 2.94).

DISCUSSION

There are obvious limitations to studies of this type, in that information obtained by questionnaires may be subject to recall bias, and the data was not substantiated by any objective test, such as skin prick testing, bronchial hyper-reactivity (BHR) testing or exercise challenge [22], However, previous work [23,24], has found that the ISAAC written and video questionnaires have reasonable sensitivity and specificity for BHR. A special problem with epidemiological studies in Malaysia is the non-homogeneity of the local population especially in relation to race, language, culture and religion. This study was conducted in a less developed and less industrialised state where over 95% of the population are Malays. This data will serve as a basis for comparison of asthma prevalence of Malays in different parts of the country to demonstrate the impact of environment on the prevalence of asthma since genetic susceptibility is expected to be similar. Although the questionnaire was translated in to the local language, Bahasa Malaysia. which has no equivalent word for "wheeze", the high rate of illiteracy among local parents may affect the responses to some of the questions in the written questionnaire leading the a lower prevalence. To ensure valid comparisons between different populations, the video questionnaire which is able to provide data relatively free from biases due to differences in language, culture, literacy in different populations[24] was used.

There had only been two previous study of asthma prevalence in Malaysia. In a study in Kuala Lumpur in 1990 involving 2,109 schoolchildren aged 7-12 years using the ATS-DLD-78C respiratory questionnaire translated into local languages, the prevalence of cumulative wheeze was 8.0% and doctor diagnosed asthma 8.7%[20]. In a study of 409 schoolchildren aged 15.5±2.1 years in Kota Kinabalu, Sabah, in East Malaysia in 1992 the prevalence of cumulative

wheeze was 7.7% and current wheeze 4.9% [21]. There were no other studies since 1992 in Malaysia. In the present study the overall prevalence of cumulative wheeze and current wheeze , 9.4% and 6.0% using the written questionnaire and 14.2% and 9.4% using the video questionnaire respectively, is significantly higher than the prevalence in Kuala Lumpur and Kota Kinabalu. Comparing our data with these two previous surveys, there does appear to be an increase in asthma prevalence over the last 5 years. However the different methodologies, age of the study population and racial distribution are confounding variables in these studies and needs to be considered.

In general, the prevalence rates of asthma of most countries in the Far East are less than those reported in the Caucasian populations [9]. The prevalence of cumulative wheeze in the Asian Pacific countries vary from as low as 1.9% in less affluent San Bu China [25] to as high as 21.8% in Singapore [13] and 20% in Hong Kong [9] which are more affluent countries , although Japan, the wealthiest nation in the region, also has a relatively low prevalence of 5.2%. The prevalent rates in Kota Bharu is comparable to those in Philippines (12.4% cumulative wheeze) and Indonesia (8.2% diagnosed asthma). [9]

Using the video questionnaire which is more reproducible and valid for international comparison the prevalence of cumulative wheeze and current wheeze in Kota Bharu were much lower than that of developed countries[26] (32% and 27% in Bochum, Germany; 40% and 30% in West Sussex, England; 47% and 36% in Wellington, New Zealand; 45% and 37% in Adelaide 48% and 50% in Sydney Australia). Besides the lower prevalence rates of asthma, the severity of asthma in terms of frequency and attacks disturbing sleep and limiting speech is also much lower than in countries in the West[26] and Singapore [13].

In this study children with asthma symptoms were more likely to have associated rhinitis symptoms (OR 4.39 for ever wheeze OR 5.33 for current wheeze) than eczema symptoms (OR 2.94 ever wheeze and OR 3.71 current wheeze). This was similar to that found in Singapore children [13]

It is not possible from this study to offer any explanation for the differences in the prevalence of asthma between Kota Bharu and other countries. It has been suggested that poverty may have a protective effect on the development of asthma. and viral infections in early life, which are more commonly associated with poverty, may preferentially direct the development of T helper cells to the TH1 pathway with subsequent inhibition of allergen sensitisation and thereby reducing the likelihood of developing allergies [27]. A repeat study using the same methodology will be needed to show the trend of the prevalence of asthma and atopic disorders in this country. Environmental and genetic risk factors will also need to be investigated to explain the differences in prevalence rates between different countries.

This study was part of an international effort to evaluate and compare the epidemiology of asthma and allergic disease around the world. Eventhough the prevalence of asthma and atopic disorders is much lower in Kota Bharu compared with other developed countries our results suggest that atopic disorders are also a problem in a Malaysian population. The reasons behind these differences are not apparent and would probably be evaluated with the ISAAC phase II protocol.

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TABLE 1

SELF REPORTED PREVALENCE OF ASTHMA - FINDINGS FROM THE WRITTEN QUESTIONNAIRE BY AGE GROUP AND SEX

	Overall n = 7055		Age Group n = 7055				Sex n = 7055			
			5-7 years n = 3939		12-14 years n = 3116		Male n = 3784		Female n = 3271	
	n	%	n	%	n	%	n	%	n	%
Wheeze ever	660	9.4	328	8.3	332	10.7	368	9.7	292	8.9
Wheeze in past 12 months	426	6.0	213	5.4	213	6.8	238	6.3	188	5.7
Attacks of wheezing in past 12 months										
None	2316	32.8	1560	39.6	756	24.3	1257	33.2	1059	32.4
1-3	372	5.3	179	4.5	193	6.2	200	5.3	172	5.3
4-12	68	1.0	33	0.8	35	1.1	43	1.1	25	0.8
>12	28	0.4	9	0.2	19	0.6	16	0.4	12	0.4
Sleep disturbed by wheezing in past 12 months										
Never	2150	30.5	1432	36.4	718	23.0	1181	31.2	969	29.6
<1 per week	303	4.3	145	3.7	158	5.1	148	3.9	155	4.7
1+ per week	28	0.4	16	0.4	12	0.4	19	0.5	9	0.3
Severe attack limiting speech in past 12 months	79	1.1	38	1.0	41	1.3	44	1.2	35	1.1
Ever diagnosed asthma	665	9.4	396	10.1	269	8.6	404	10.7	261	8.0
Exercise induced wheeze in past 12 months	460	6.5	153	3.9	307	9.9	252	6.7	208	6.4
Night cough in past 12 months	1475	20.9	803	20.4	672	21.6	780	20.6	695	21.2

TABLE 2

SELF REPORTED PREVALENCE OF ASTHMA:
FINDINGS FROM THE VIDEO QUESTIONNAIRE

	12-14 year					
	Overall n = 3116		Males n = 1805		Females n = 1311	
	n	%	n	%	n	%
Mild wheeze while at rest						
Ever	157	5.0	82	4.5	75	5.7
In past 12 months	118	3.8	66	3.7	52	4.0
Once or more/month	77	2.5	40	2.2	37	2.8
Wheeze after exercise						
Ever	340	10.9	207	11.5	133	10.1
In past 12 months	214	6.9	139	7.7	75	5.7
Once or more/month	152	4.9	94	5.2	58	4.4
Waking with wheeze						
Ever	90	2.9	40	2.2	50	3.8
In past 12 months	54	1.7	25	1.4	29	2.2
Once or more/month	38	1.2	16	0.9	22	1.7
Any wheeze (Yes to any of questions 1-3)						
Ever	442	14.2	257	14.2	185	14.1
In past 12 months	292	9.4	181	10.0	111	8.5
Once or more/month	204	6.5	115	6.4	89	6.8
Waking with cough						
Ever	263	8.4	119	6.6	144	11.0
In past 12 months	159	5.1	76	4.2	83	6.3
Once or more/month	105	3.4	49	2.7	56	4.3
Severe attack of wheeze						
Ever	107	3.4	54	3.0	53	4.0
In past 12 months	66	2.1	40	2.2	26	2.0
Once or more/month	42	1.3	22	1.2	20	1.5

TABLE 3

SELF-REPORTED PREVALENCE OF WHEEZE EVER:
CONCORDANCE BETWEEN THE WRITTEN AND VIDEO QUESTIONNAIRES
FOR 13-14 YEAR OLDS

Written Questionnaire	Video Questionnaire	%	n
Yes	Yes	5.8	182
Yes	No	4.8	150
No	Yes	8.3	260
No	No	81.0	2524
Concordance		86.8	2706

TABLE 4

SELF-REPORTED PREVALENCE OF WHEEZW IN THE PAST YEAR:
CONCORDANCE BETWEEN THE WRITTEN AND VIDEO QUESTIONNAIRES
FOR 13-14 YEAR OLDS

Written Questionnaire	Video Questionnaire	%	n
Yes	Yes	3.2	100
Yes	No	3.6	113
No	Yes	6.2	192
No	No	87.0	2711
Concordance		90.2	2811

TABLE 5

SELF REPORTED PREVALENCE OF RHINITIS - FINDINFS FROM THE WRITTEN QUESTIONNAIRE BY AGE GROUP AND SEX

	Overall		Age Group				Sex			
			5-7 years n = 3939		12-14 years n = 3116		Male n = 3784		Female n = 3271	
	n	%	n	%	n	%	n	%	n	%
Sneezing or running or blocked nose ever	1907	27.0	718	18.2	1189	38.2	1064	28.1	843	25.8
Sneezing or running or blocked nose in past 12 months	1489	21.1	577	14.6	912	29.3	816	21.6	673	20.6
Above nose problems accompanied by itchy-watery eyes	526	7.5	182	4.6	344	11.0	276	7.3	250	7.6
Above nose problems interfering with daily activities										
None	1463	20.7	1039	26.4	424	13.6	767	20.3	696	21.3
A little	1019	14.4	491	12.5	528	16.9	609	16.1	410	12.5
Moderate	661	9.4	212	5.4	449	14.4	320	8.5	341	10.4
A lot	147	2.1	76	1.9	71	2.3	75	2.0	72	2.2
Ever diagnosed allergic rhinitis	1232	17.5	608	15.4	624	20.0	630	16.6	602	18.4

TABLE 6

SELF REPORTED PREVALENCE OF ECZEMA - FINDINGS FROM THE WRITTEN QUESTIONNAIRE BY AGE GROUP AND SEX

	Overall		Age Group				Sex			
			5-7 years n = 3939		12-14 years n = 3116		Male n = 3784		Female n = 3271	
	n	%	n	%	n	%	n	%	n	%
Itchy rash ever	846	12.0	539	13.7	307	9.9	464	12.3	382	11.7
Itchy rash in the past 12 months	823	11.7	520	13.2	303	9.7	439	11.6	384	11.7
Itcy rash with typical distribution	930	13.2	553	14.0	377	12.1	506	13.4	424	13.0
Age itchy rash first occur (asked in 5-7 year old questionnaire only)										
<2 years	-	-	287	7.3	-	-	-	-	-	-
2-4 years	-	-	208	5.3	-	-	-	-	-	-
5 or more	-	-	374	9.5	-	-	-	-	-	-
Rash cleared during past 12 months	863	12.2	582	14.8	281	9.0	453	12.0	410	12.5
Times kept awake by itchy rash in past 12 months										
Never	1745	24.7	1068	27.1	677	21.7	936	24.7	809	24.7
<1 per week	430	6.1	236	6.0	194	6.2	229	6.1	201	6.1
1+ per week	88	1.2	64	1.6	24	0.8	55	1.5	33	1.0
Ever diagnosed eczema	182	2.6	53	1.3	129	4.1	86	2.3	96	2.9